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# SEARCH REQUEST FORM

**Scientific and Technical Information Center**

Requester's Full Name: JOHN MAPLES Examiner #: 62294 Date: 2-28-07
Art Unit: 1745 Phone Number ~~30~~ 2-1287 Serial Number: 10/749,337
Mail Box and Bldg/Room Location: REM-6-C89 Results Format Preferred (circle): (PAPER) DISK E-MAIL

**If more than one search is submitted, please prioritize searches in order of need.**

**********

Please provide a detailed statement of the search topic, and describe as specifically as possible the subject matter to be searched. Include the elected species or structures, keywords, synonyms, acronyms, and registry numbers, and combine with the concept or utility of the invention. Define any terms that may have a special meaning. Give examples or relevant citations, authors, etc, if known. Please attach a copy of the cover sheet, pertinent claims, and abstract.

Title of Invention: SEPARATION MEMBRANE FOR BATTERY

Inventors (please provide full names): GA-LANE CHEN; CHARLES LEU

Earliest Priority Filing Date: ~~12/31/01~~ 12/31/02

***For Sequence Searches Only* Please include all pertinent information (parent, child, divisional, or issued patent numbers) along with the appropriate serial number.**

A separation membrane for a rechargeable battery, comprising:

a plurality of composite layers attached to each other, each of the composite layers comprising a plurality of molecular layers;

wherein each of the molecular layers comprises a plurality of equilateral triangle units, each of which has three lithium ions at three vertexes thereof and a carbon atom at a center thereof.

A separation membrane for a rechargeable battery, comprising:

a plurality of composite layers attached to each other, each of the composite layers comprising a plurality of molecular layers;

wherein each of the molecular layers comprises a plurality of equilateral triangle units arranged in an alternative/staggered manner so as to form a hexagonal extension thereof, wherein each of the equilateral triangle units has three lithium ions at three vertexes thereof and means for attracting said three lithium ions at a center thereof. (MEANS CAN BE CARBON, SILICON OR GERMANIUM)

**********

STAFF USE (each of said molecular layers defines silicon carbide, or silicon oxide, or compositions of carbon and silicon carbide, and or compositions of silicon and germanium thereof)

Searcher: EL
Searcher Phone #:
Searcher Location:
Date Searcher Picked Up:
Date Completed: 3-7-07
Searcher Prep & Review Time:
Clerical Prep Time:
Online Time:

Bibliographic
Litigation
Fulltext
Patent Family
Other

Questel/Orbit
Dr.Link
Lexis/Nexis
Sequence Systems
WWW/Internet
Other (specify)

PTO-1590 (8-01)

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=> => FILE REG
FILE 'REGISTRY' ENTERED AT 16:57:32 ON 07 MAR 2007
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=> DISPLAY HISTORY FULL L1-

     FILE 'HCAPLUS' ENTERED AT 16:29:19 ON 07 MAR 2007
L1         15350 SEA CHEN G?/AU
L2           244 SEA LEU C?/AU
L3            65 SEA L1 AND L2
L4         34601 SEA (SEP# OR SEPN# OR SEPG# OR SEPARAT?)(2A)MEMBRAN?
L5             2 SEA L3 AND L4

     FILE 'REGISTRY' ENTERED AT 16:31:34 ON 07 MAR 2007
                 E CARBON/CN
L6             1 SEA CARBON/CN
                 E SILICON/CN
L7             1 SEA SILICON/CN
                 E GERMANIUM/CN
L8             1 SEA GERMANIUM/CN

     FILE 'HCA' ENTERED AT 16:34:30 ON 07 MAR 2007
L9        233378 SEA BATTERY OR BATTERIES OR (ELECTROLY? OR ELECTROCHEM?
                 OR GALVANI? OR WET OR DRY OR PRIMARY OR SECONDARY)(2A)(CE
                 LL OR CELLS) OR WETCELL? OR DRYCELL?
L10        33352 SEA (SEP# OR SEPN# OR SEPG# OR SEPARAT?)(2A)MEMBRAN?
L11       338960 SEA L6
L12       147789 SEA (CARBON# OR C)(2A)(ATOM# OR ION#)
L13        39088 SEA (LITHIUM# OR LI)(2A)(ATOM# OR ION# OR CATION#)
L14       338960 SEA L6
L15       462068 SEA L7
L16        73911 SEA L8
L17        36438 SEA (MOL# OR MOLECULAR?)(2A)(FILM? OR COAT? OR LAYER? OR
                 MULTILAYER? OR LAMEL? OR LAMIN?)
L18        32989 SEA TRIANG?
L19        44527 SEA INTERCALAT? OR INTER(A)CALAT?
L20        17416 SEA VERTEX? OR VERTICE?
L21          117 SEA L9 AND L10 AND L13
L22            2 SEA L21 AND L17
L23            1 SEA L21 AND L18
L24            9 SEA L21 AND L19
L25            0 SEA L21 AND L20
L26            8 SEA L21 AND L12
L27           12 SEA L21 AND L14
L28            3 SEA L21 AND L15
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L29           2 SEA L21 AND L16
L30        1995 SEA L9 AND L10
L31          10 SEA L30 AND L17
L32           1 SEA L30 AND L18
L33          23 SEA L30 AND L19
L34           0 SEA L30 AND L20
L35           6 SEA L33 AND (L12 OR L14 OR L15 OR L16)

     FILE 'REGISTRY' ENTERED AT 16:50:38 ON 07 MAR 2007
                E LITHIUM/CN
L36           1 SEA LITHIUM/CN

     FILE 'HCA' ENTERED AT 16:51:06 ON 07 MAR 2007
L37               QUE L36 OR LITHIUM# OR LITHIAT? OR LI
L38          21 SEA L33 AND L37
L39           9 SEA L22 OR L23 OR L28 OR L29 OR L32 OR L35
L40          18 SEA (L24 OR L27 OR L31) NOT L39
L41          12 SEA L38 NOT (L39 OR L40)
L42           4 SEA 1840-2002/PY,PRY AND L39
L43          15 SEA 1840-2002/PY,PRY AND L40
L44           7 SEA 1840-2002/PY,PRY AND L41



=> FILE HCA
FILE 'HCA' ENTERED AT 16:58:00 ON 07 MAR 2007
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=> D L42 1-4 CBIB ABS HITSTR HITIND

L42  ANSWER 1 OF 4  HCA  COPYRIGHT 2007 ACS on STN
143:29436  Battery separator membrane.
     Chen, Jieliang; Lu, Changyue (Hongfujin Precision Industry Shenzhen
     Co., Ltd., Peop. Rep. China). Faming Zhuanli Shenqing Gongkai
     Shuomingshu CN 1512606 A 20040714, No pp. given (Chinese). CODEN:
     CNXXEV. APPLICATION: CN 2002-151640 20021228.
AB   This battery isolation membrane consists of a multilayer
     bonded by bonding agents. Each layer includes multiple
     mol. layers composed of C atoms and
     Li ions, among which, every three adjacent
     Li ions form a pos. triangle unit, every
     C atom is placed at its center connecting with the Li
     ions by floating keys and adjacent C atoms form a C-6 ring
     with covalent bond, the layer no. is 5-20, each is 500 nm - 500
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μm thick, and the edge of the **triangle** is 25-100 nm long.

IC ICM H01M002-14
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
ST **battery separator membrane**
IT Secondary **battery separators**
(**battery separator membrane**)

L42 ANSWER 2 OF 4 HCA COPYRIGHT 2007 ACS on STN
142:180371 Lithium electrode combined with **separator membrane** in one body and lithium **battery** employing the electrode. Cho, Byeong Won; Cho, Won Il; Kim, Hyeong Seon; Kim, Un Seok; Park, Ho Yeong (Korea Institute of Science and Technology, S. Korea). Repub. Korean Kongkae Taeho Kongbo KR 2002093536 A 20021216, No pp. given (Korean). CODEN: KRXXA7. APPLICATION: KR 2001-32338 20010609.

AB A lithium electrode combined with a **separator membrane** in a body and a primary or secondary lithium **battery** employing the electrode are provided, to improve the capacity of a **battery**, the charging/discharging efficiency and the lifetime. The lithium electrode is combined with a **separator membrane** in a body, which one side of the **separator membrane** is coated with lithium and metals in multilayered structure or composite structure by several to several tens micrometers. The metal is selected from the group consisting of Li, Al, Sn, Bi, Si, Sb, Ni, Cu, Ti, V, Cr, Mn, Co, Zn, Mo, W, Ag, Au, Ru, Pt and their alloys. The **separator membrane** comprises the material selected from the group consisting of PP, PE, PVdF and nonwoven. The secondary lithium **battery** comprises the lithium electrode, and a pos. electrode active material selected from the group consisting of LiCoO2, LiNiO2, LiNiCoO2, LiMn2O4, V2O5 and V6O13. The primary lithium **battery** comprises the lithium electrode, and a pos. electrode active material selected from the group consisting of MnO2, (CF)n and SOCl2.

IT **7440-21-3**, Silicon, uses
(**separator membrane** coated with; lithium electrode combined with **separator membrane** in one body and lithium **battery** employing the electrode)
RN 7440-21-3 HCA
CN Silicon (CA INDEX NAME)

Si

IC ICM H01M010-36
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
ST lithium electrode **separator membrane** primary

secondary lithium **battery** electrode

IT **Battery** cathodes
(lithium electrode combined with **separator membrane** in one body and lithium **battery** employing electrode)

IT Fluoropolymers, uses
(lithium electrode combined with **separator membrane** in one body and lithium **battery** employing electrode)

IT Primary **battery** separators
Secondary **battery** separators
(lithium electrode combined with **separator membrane** in one body and lithium **battery** employing the electrode)

IT **Ion**-selective electrodes
(**lithium**-selective electrodes; lithium electrode combined with **separator membrane** in one body and lithium **battery** employing the electrode)

IT Primary **batteries**
Secondary **batteries**
(lithium; lithium electrode combined with **separator membrane** in one body and lithium **battery** employing the electrode)

IT 1313-13-9, Manganese oxide (MnO2), uses 1314-62-1, Vanadium oxide (V2O5), uses 7719-09-7, Thionyl chloride 12031-65-1, Lithium nickel oxide (LiNiO2) 12037-42-2, Vanadium oxide (V6O13) 12057-17-9, Lithium manganese oxide (LiMn2O4) 12190-79-3, Lithium cobalt oxide LiCoO2 24937-79-9 162004-08-2, Cobalt lithium nickel oxide ((Co,Li,Ni)O2)
(electrode active material; lithium electrode combined with **separator membrane** in one body and lithium **battery** employing electrode)

IT 7429-90-5, Aluminum, uses 7439-93-2, Lithium, uses
(**separator membrane** coated with; lithium electrode combined with **separator membrane** in one body and lithium **battery** employing electrode)

IT 7439-96-5, Manganese, uses 7439-98-7, Molybdenum, uses 7440-02-0, Nickel, uses 7440-06-4, Platinum, uses 7440-18-8, Ruthenium, uses **7440-21-3**, Silicon, uses 7440-22-4, Silver, uses 7440-31-5, Tin, uses 7440-32-6, Titanium, uses 7440-33-7, Tungsten, uses 7440-36-0, Antimony, uses 7440-47-3, Chromium, uses 7440-48-4, Cobalt, uses 7440-50-8, Copper, uses 7440-57-5, Gold, uses 7440-62-2, Vanadium, uses 7440-66-6, Zinc, uses 7440-69-9, Bismuth, uses
(**separator membrane** coated with; lithium electrode combined with **separator membrane** in one body and lithium **battery** employing the electrode)

APPLICANT

L42 ANSWER 3 OF 4 HCA COPYRIGHT 2007 ACS on STN
141:413664 **Separation membrane** for **battery**
. Chen, Ga-Lane; Leu, Charles (USA). U.S. Pat. Appl. Publ. US 2004229115 A1 20041118, 4 pp. (English). CODEN: USXXCO.
APPLICATION: US 2003-749337 20031231. PRIORITY: TW 2002-91137954 20021231.

AB A **sepn. membrane** for a **battery** includes a no. of composite layers attached to each other with adhesive. Each composite layer includes a no. of **mol. layers**. Each **mol. layer** comprises **carbon atoms**, and **lithium ions intercalated** therein.

IT **7440-21-3**, Silicon, uses **7440-44-0**, Carbon, uses **7440-56-4**, Germanium, uses
(**sepn. membrane** for **battery**)

RN 7440-21-3 HCA
CN Silicon (CA INDEX NAME)

Si

RN 7440-44-0 HCA
CN Carbon (CA INDEX NAME)

C

RN 7440-56-4 HCA
CN Germanium (CA INDEX NAME)

Ge

IC ICM H01M002-18
INCL 429144000
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
ST **battery separator membrane**
IT Secondary **batteries**
(lithium; **sepn. membrane** for **battery**
)
IT **Membranes**, nonbiological
Secondary **battery separators**
(**sepn. membrane** for **battery**)
IT **7440-21-3**, Silicon, uses **7440-44-0**, Carbon, uses **7440-56-4**, Germanium, uses
(**sepn. membrane** for **battery**)

L42 ANSWER 4 OF 4 HCA COPYRIGHT 2007 ACS on STN

127:20819 Rechargeable zinc-carbon hybrid cells. Kordesch, Karl V.; Fabjan, Christoph; Daniel-Ivad, Josef; Oliveira, Julio (Technical University Graz, Stremayrgasse 16, A-8010, Graz, Austria). Journal of Power Sources, 65(1-2), 77-80 (English) **1997**. CODEN: JPSODZ. ISSN: 0378-7753. Publisher: Elsevier.

AB A rechargeable zinc-carbon-bromine-complex cell with an immobilized electrolyte is described. The cell resembles a cylindrical Leclanche cell with an outside zinc can and a carbon-rod contg. bobbin. A **membrane**-type **separator** prevents shorting on charge. Unlike a Leclanche cell, which has a very limited rechargeability, this zinc-carbon-bromine-complex system can deliver high currents with excellent rechargeability after many complete discharges and is insensitive to cell reversal. Org. complexing agents and additives bind or **intercalate** the bromine which is formed on charge and overcharge. 'Hybrid cells' with MnO2 and graphite-contg. cathodes have a useful initial capacity and show a better shelf-life than the simple zinc-carbon-bromine system.

IT **7440-44-0**, Carbon, uses
(activated; rechargeable zinc-carbon-bromine complex hybrid **batteries** with immobilized electrolyte)

RN 7440-44-0 HCA

CN Carbon (CA INDEX NAME)

C

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST zinc carbon bromine rechargeable hybrid **battery**; secondary **battery** zinc carbon bromine

IT Carbon black, uses
(rechargeable zinc-carbon-bromine complex hybrid **batteries** with immobilized electrolyte)

IT Secondary **batteries**
(zinc-carbon-bromine; rechargeable zinc-carbon-bromine complex hybrid **batteries** with immobilized electrolyte)

IT **7440-44-0**, Carbon, uses
(activated; rechargeable zinc-carbon-bromine complex hybrid **batteries** with immobilized electrolyte)

IT 7699-45-8, Zinc bromide
(electrolyte; rechargeable zinc-carbon-bromine complex hybrid **batteries** with immobilized electrolyte)

IT 1313-13-9, Manganese dioxide, uses 7440-66-6, Zinc, uses 7726-95-6D, Bromine, complexes, uses 7782-42-5, Graphite, uses
(rechargeable zinc-carbon-bromine complex hybrid **batteries** with immobilized electrolyte)

=> D L43 1-15 CBIB ABS HITSTR HITIND

L43 ANSWER 1 OF 15 HCA COPYRIGHT 2007 ACS on STN
143:176263 Modified **lithium ion** polymer **battery**. Zhang, Guiping; Yu, Yongyang; Lee, Torng Jinn (Peop. Rep. China). U.S. Pat. Appl. Publ. US 2005170248 A1 20050804, 6 pp., Cont.-in-part of U.S. Ser. No. 933,838. (English). CODEN: USXXCO. APPLICATION: US 2005-48826 20050203. PRIORITY: US 2001-933838 20010822.

AB A modified **Li ion** polymer **battery**, comprises multiple pos. electrode sheets and multiple neg. electrode sheets formed by blending binder with pos. or neg. electrode powder, resp., and then coating or rolling with resulting mixt. over copper foil or aluminum foil. Binder can be prepd. from the following three components: (a) 0.1 wt.%-95 wt.% of polyvinylidene fluoride, (b) 0.1 wt.%-90 wt.% of modified polyacrylates, (c) 0.1 wt.%-85 wt.% of a modified polyethylene or polydienes, and choosing one or any two from them mixing in a proper ratio. The invention still provides a **sepn. membrane**, which is a non-porous polyalkylene oxide film, or a film made by coating a blend of polyalkylene oxide and polyvinylidene fluoride, or a micro-porous polypropylene film, or a three-layered composite film of polypropylene, polyethylene and polypropylene. Fabrication of modified **lithium ion** polymer **battery** as following process: (1) pos. and neg. electrode sheets are laminated with **sepn. membrane** and rolled in an alternative and isolated manner to form an overlap stack; (2) pos. and neg. electrode sheets are welded with pos. and neg. collectors, resp.; and (3) the whole laminate is assembled with an aluminum plastic membrane.

IT **7440-44-0**, Carbon, uses
(modified **lithium ion** polymer **battery**
)
RN 7440-44-0 HCA
CN Carbon (CA INDEX NAME)

C

IC ICM H01M004-62
ICS H01M004-66; H01M002-02; H01M004-50; H01M004-52; H01M010-40
INCL 429217000; 429245000; 429317000; 429316000; 429176000; 429231300; 429223000; 429224000; 429307000
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38
ST **lithium ion** polymer **battery**
IT Secondary **batteries**
(**lithium**; modified **lithium ion**

polymer **battery**)
IT Secondary **battery** separators
(modified **lithium ion** polymer **battery**
)
IT Polyoxyalkylenes, uses
(modified **lithium ion** polymer **battery**
)
IT Acrylic polymers, uses
(modified **lithium ion** polymer **battery**
)
IT Carbon black, uses
(modified **lithium ion** polymer **battery**
)
IT Fluoropolymers, uses
(modified **lithium ion** polymer **battery**
)
IT Petroleum coke
(modified **lithium ion** polymer **battery**
)
IT Polymer blends
(modified **lithium ion** polymer **battery**
)
IT Alkadienes
(polymers; modified **lithium ion** polymer **battery**)
IT 96-49-1, Ethylene carbonate 105-58-8, Diethyl carbonate 108-32-7, Propylene carbonate 110-71-4 616-38-6, Dimethyl carbonate 623-96-1, Dipropyl carbonate 7429-90-5, Aluminum, uses 7440-50-8, Copper, uses 7791-03-9, Lithium perchlorate 9003-07-0, Polypropylene 9011-14-7, Pmma 12031-65-1, Lithium nickel oxide (LiNiO2) 12057-17-9, Lithium manganese oxide (LiMn2O4) 12190-79-3, Cobalt lithium oxide (CoLiO2) 14283-07-9, Lithium tetrafluoroborate 18424-17-4, Lithium hexafluoroantimonate 21324-40-3, Lithium hexafluorophosphate 29935-35-1, Lithium hexafluoroarsenate 33454-82-9, Lithium triflate 73506-93-1, Diethoxyethane 90076-65-6 135573-53-4, Cobalt lithium nickel oxide co0-1lini0-1o2
(modified **lithium ion** polymer **battery**
)
IT **7440-44-0**, Carbon, uses 7782-42-5, Graphite, uses 9002-88-4, Polyethylene 24937-79-9, Polyvinylidene fluoride
(modified **lithium ion** polymer **battery**
)

L43 ANSWER 2 OF 15 HCA COPYRIGHT 2007 ACS on STN
142:300938 Fabrication of **lithium-ion batteries** for cell phones. Zhang, Xiaoran; Wang, Chunsheng (Helongjiang Weiyou Chemical Engineering Industrial Corporation of

Limited Liability, Peop. Rep. China). Faming Zhuanli Shenqing Gongkai Shuomingshu CN 1472839 A 20040204, 7 pp. (Chinese). CODEN: CNXXEV. APPLICATION: CN 2002-132728 20020802.

AB A **Li-ion battery** consists of an anode, a cathode, a **membrane separator**, and liq. electrolyte. The cathode material is LiCoO2 65-85%, Li2CO3 0.5-1.5%, conductive C black 5-10%, a blend of poly(vinylidene difluoride) and Me methacrylate 5-15%, and di-Bu phthalate or isobutene 1.5-15%;. The anode material is meso-C microbeads 70-85%, conductive C black 5-10%, blend of poly(vinylidene difluoride) and Me methacrylate 5-10%, and di-Bu phthalate or isobutene 3-10%;. The **membrane separator** is a blend of poly(vinylidene difluoride) and Me methacrylate 40-60%, vapor-deposited SiO2 2-10%, and di-Bu phthalate or isobutene 38-50%. The electrolyte is a 1M soln. of LiPF6, LiClO4, LiAsF6, LiBF4, or Li bis(trifluoromethanesulfonyl) imide in a plasticizer such as ethylene carbonate, di-Me carbonate, methylethyl carbonate and/or divinyl carbonate. Manuf. of the **battery** entails: (a) coating a slurry of the cathode material on a an Al grid and hot rolling at 110-120° to form the cathode plate, (b) coating a slurry of the anode material on a Cu grid and hot rolling at 110-120° to form an anode plate, (c) assembling the cathode and anode plates with the **membrane separator**, hot rolling at 110-120° to form a **battery** unit, extg. with MeOH, EtOH, or isobutanol, and (c) placing the **battery** unit in an Al casing, filling casing with liq. electrolyte and vacuum packaging.

IT **7440-44-0**, Carbon, uses
(fabrication of **lithium-ion batteries** for cell phones)

RN 7440-44-0 HCA

CN Carbon (CA INDEX NAME)

C

IC ICM H01M010-38
ICS H01M010-40

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST lithium **battery** fabrication cell phone

IT Carbon black, uses
Fluoropolymers, uses
(fabrication of **lithium-ion batteries** for cell phones)

IT Secondary **batteries**
(lithium; fabrication of **lithium-ion batteries** for cell phones)

IT 80-62-6, Methyl methacrylate 84-74-2, Dibutyl phthalate 96-49-1,

Ethylene carbonate 115-11-7, Isobutene, uses 554-13-2, Lithium carbonate (Li2CO3) 616-38-6, Dimethyl carbonate 623-53-0, Methylethyl carbonate 7429-90-5, Aluminum, uses **7440-44-0**, Carbon, uses 7440-50-8, Copper, uses 7570-02-7, Divinyl carbonate 7631-86-9, Silica, uses 7791-03-9, Lithium perchlorate 12190-79-3, Lithium cobalt oxide (LiCoO2) 14283-07-9, Lithium tetrafluoroborate 21324-40-3, Lithium hexafluorophosphate 24937-79-9, Poly(vinylidene difluoride) 29935-35-1, Lithium hexafluoroarsenate 90076-65-6, Lithium bis(trifluoromethanesulfonyl) imide
(fabrication of **lithium-ion batteries** for cell phones)

L43 ANSWER 3 OF 15 HCA COPYRIGHT 2007 ACS on STN
140:256258 Secondary **lithium ion battery**.
Nishikawa, Satoshi; Honmoto, Hiroyuki; Omichi, Takahiro (Teijin Ltd., Japan). Jpn. Kokai Tokkyo Koho JP 2004087173 A 20040318, 13 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 2002-243184 20020823.

AB The **battery** has a Li **intercalating** anode, a Li contg. transition metal oxide cathode, and a nonaq. electrolyte soln.; where the **battery** separator is an electrolyte soln. swollen porous polymer membrane contg. a nonwoven fabric, the cathode active mass is Li1+xMn2-xO4 (0.01 <x <.030), and the **battery** has Qpe < (Qm+Qn) <Qpt (Qpe, Qm, Qn, and Qpt are the amt. of decalatable Li in the cathode active mass, the overcharge preventing characteristic value of the separator, the amt. of **intercalatable** Li of the anode active mass, and the total amt. of Li in the cathode active mass, resp.). The separator has an av. thickness (t) 10-35 μm, base wt. (w) 10-25 g/m2, and gas permeability (p) ≤60 s (JIS P8117); and the nonwoven fabric has t 10-30 μm, w 6-20 g/m2, p ≤10 s, Mcmillan no. (m) ≤10, and t+m<200 μm.

IC ICM H01M010-40
ICS H01M002-16; H01M004-02; H01M004-58

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST secondary lithium **battery** electrode capacity; overcharge preventing characteristic value secondary lithium **battery** separator; electrolyte impregnated nonwoven fabric **membrane separator** secondary lithium **battery**; Mcmillan no separator secondary lithium **battery**

IT Secondary **battery** separators
(characteristics of separators contg. nonwoven fibers and electrolyte solns. for secondary lithium **batteries**)

IT Polyester fibers, uses
Polyoxyalkylenes, uses
(characteristics of separators contg. nonwoven fibers and electrolyte solns. for secondary lithium **batteries**)

IT Polyesters, uses
(fibers; characteristics of separators contg. nonwoven fibers and electrolyte solns. for secondary lithium **batteries**)
IT Secondary **batteries**
(lithium; secondary lithium **batteries** with controlled relations among electrode capacities separator overcharge preventing values)
IT 127-19-5, N,N-Dimethylacetamide 24800-44-0, Tripropylene glycol 25101-47-7, Chlorotrifluoroethylene-hexafluoropropylene-vinylidene fluoride copolymer 25322-69-4, Polypropylene glycol
(characteristics of separators contg. nonwoven fibers and electrolyte solns. for secondary lithium **batteries**)
IT 25038-59-9, Poly(ethylene terephthalate), uses
(fibers; characteristics of separators contg. nonwoven fibers and electrolyte solns. for secondary lithium **batteries**)

L43 ANSWER 4 OF 15 HCA COPYRIGHT 2007 ACS on STN
139:103796 Porous membrane having a base of a mixture of a fluoropolymer and a silane. Barriere, Benoit (ATOFINA, Fr.). Fr. Demande FR 2834651 A1 20030718, 20 pp. (French). CODEN: FRXXBL. APPLICATION: FR 2002-497 20020116.
AB The present invention concerns a porous membrane based on a mixt. contg., by wt., 0.1-≤30% silane and ≥70-99.9% fluoropolymer. The invention relates also to the electrochem. generators having a pos. electrode, a separator and a neg. electrode and in which at least an electrode or the separator is consisted of the preceding porous membrane. To constitute a **separator** the **membrane** advantageously contains a load of filler, for example silica, and to constitute an electrode it contains either of carbon black or of metal oxides. The porous membrane of the invention is advantageously a separator in a **battery** **Li-ion**.
IT **7440-44-0**, Activated carbon, uses
(activated; porous membrane having a base of mixt. of a fluoropolymer and a silane)
RN 7440-44-0 HCA
CN Carbon (CA INDEX NAME)

C

IC ICM B01D071-34
ICS H01M002-16; B01D071-82
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38, 39
ST porous membrane fluoropolymer silane secondary lithium carbonate **battery** separator; membrane **battery** electrode polymer composite

IT Secondary **batteries**
(lithium; porous membrane having a base of mixt. of a fluoropolymer and a silane)
IT **Battery** electrodes
Pore size
Porosity
Secondary **battery separators**
(porous **membrane** having a base of mixt. of a fluoropolymer and a silane)
IT **7440-44-0**, Activated carbon, uses
(activated; porous membrane having a base of mixt. of a fluoropolymer and a silane)

L43 ANSWER 5 OF 15 HCA COPYRIGHT 2007 ACS on STN
138:190736 Modified **lithium ion** polymer **battery**. Zhang, Guiping; Yu, Yongyang; Lee, Torng Jinn (Peop. Rep. China). U.S. Pat. Appl. Publ. US 2003039886 A1 20030227, 6 pp. (English). CODEN: USXXCO. APPLICATION: US 2001-933838 20010822.
AB A modified **lithium ion** polymer **battery**, comprises a pos. electrode sheet and a neg. electrode sheet, formed by blending a binder with pos. electrode powder and coating the resulting blend on a copper foil or an aluminum foil used as the collector, wherein the binder can be prepd. from the following three components: (a) 0.1-95 wt% of polyvinylidene fluoride; (b) 0.1-90 wt% of a modified polyacrylates; and (c) 0.1-85 wt% of a modified polyethylene or polydienes; alone, or from any two or all of them in a proper ratio; and a **sepn. membrane**, which is a nonporous polyalkylene oxide film or a film made by coating a blend of polyalkylene oxide and polyvinylidene fluoride, or a micro-porous polypropylene film, or a three-layered composite film of polypropylene/polyethylene/polypropylene; wherein the pos. and neg. electrode sheets are laminated with the **sepn. membrane** to form an overlap sheet or roll in an alternative and isolation manner; the pos. and neg. collectors are welded, resp.; and the whole laminate is assembled with an aluminum plastic membrane to form the **lithium ion** polymer **battery**.
IT **7440-44-0**, Carbon, uses
(mesocarbon microbeads; modified **lithium ion** polymer **battery**)
RN 7440-44-0 HCA
CN Carbon (CA INDEX NAME)

C

IC ICM H01M004-62

ICS H01M004-50; H01M004-52; H01M010-40
INCL 429217000; 429317000; 429316000; 429231100; 429231300; 429223000; 429224000; 429231800; 429338000; 429342000
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38
ST **lithium ion** polymer **battery** modified
IT Carbonaceous materials (technological products)
(hard; modified **lithium ion** polymer **battery**)
IT Secondary **batteries**
(**lithium**; modified **lithium ion** polymer **battery**)
IT **Battery** anodes
**Battery** cathodes
Secondary **battery** separators
(modified **lithium ion** polymer **battery**)
IT Petroleum coke
Polyoxyalkylenes, uses
(modified **lithium ion** polymer **battery**)
IT Carbon black, uses
(modified **lithium ion** polymer **battery**)
IT Fluoropolymers, uses
(modified **lithium ion** polymer **battery**)
IT Alkadienes
(polymers; modified **lithium ion** polymer **battery**)
IT **7440-44-0**, Carbon, uses
(mesocarbon microbeads; modified **lithium ion** polymer **battery**)
IT 96-49-1, Ethylene carbonate 105-58-8, Diethyl carbonate 108-32-7, Propylene carbonate 110-71-4 616-38-6, Dimethyl carbonate 623-96-1, Dipropyl carbonate 7429-90-5, Aluminum, uses 7440-50-8, Copper, uses 7791-03-9, Lithium perchlorate 9003-07-0, Polypropylene 9011-14-7, Pmma 12031-65-1, Lithium nickel oxide linio2 12057-17-9, Lithium manganese oxide limn2o4 12190-79-3, Cobalt lithium oxide colio2 14283-07-9, Lithium tetrafluoroborate 18424-17-4, Lithium hexafluoroantimonate 21324-40-3, Lithium hexafluorophosphate 29935-35-1, Lithium hexafluoroarsenate 33454-82-9, Lithium triflate 52627-24-4, Cobalt lithium oxide 73506-93-1, Diethoxyethane 90076-65-6 135573-53-4, Cobalt lithium nickel oxide co0-1lini0-1o2
(modified **lithium ion** polymer **battery**)
IT 9002-88-4, Polyethylene 24937-79-9, Polyvinylidene fluoride

49717-87-5, 2-Propenoic acid, ion(1-), homopolymer, uses
(modified **lithium ion** polymer **battery**
)
IT 7782-42-5, Graphite, uses
(natural; modified **lithium ion** polymer
**battery**)

L43 ANSWER 6 OF 15 HCA COPYRIGHT 2007 ACS on STN
135:48571 Laminated composite polyolefin **membrane** for **battery separator** and filter. Kobayashi, Shigeaki; Funaoka, Hidehiko; Kaimai, Norimitsu; Kono, Koichi; Takita, Kotaro (Tonen Chemical Corp., Japan). Jpn. Kokai Tokkyo Koho JP 2001162742 A **20010619**, 9 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 1999-351154 19991210.
AB The composite membrane consists of a biaxially-oriented polyolefin porous **film** contg. ultrahigh **mol.** wt. polyolefin having wt. av. mol. wt. ≥1,000,000 or its mixt. with polyolefin having wt. av. mol. wt. ≥10,000 and <1,000,000 and having av. open pore size 0.01-0.10 μm and bubble point ≥980 KPa laminated with a nonwoven fabric contg. a composite fiber consisting of a polyethylene sheath and a core resin having m.p. 20° higher than the polyethylene. Optionally, the polyethylene sheath is hydrophilically treated. A **battery separator** using the **membrane** and a **battery** using the separator are also claimed. Also claimed is a filter using the membrane. The membrane has high melt down temp. and the **battery** shows high safety.
IC ICM B32B027-32
ICS B32B005-32; H01M002-16
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38, 47
ST polyolefin laminate composite membrane polyethylene fiber nonwoven fabric; filter polyolefin laminate composite membrane; **battery separator** polyolefin composite **membrane** UHMWPE HDPE fiber safety
IT Polyolefin fibers
(ethylene, nonwoven fabrics; laminated composite polyolefin **membrane** for **battery separator** and filter)
IT Filters
Membranes, nonbiological
Nonwoven fabrics
Safety
Secondary **battery** separators
(laminated composite polyolefin **membrane** for **battery separator** and filter)
IT Polyolefins
(laminated composite polyolefin **membrane** for

**battery separator** and filter)

IT Secondary **batteries**
(lithium; laminated composite polyolefin **membrane** for **battery separator** and filter)

IT Polypropene fibers, uses
(nonwoven fabrics; laminated composite polyolefin **membrane** for **battery separator** and filter)

IT 25085-53-4, Isotactic polypropene
(fiber, core, nonwoven fabrics; laminated composite polyolefin **membrane** for **battery separator** and filter)

IT 9002-88-4, Polyethylene
(fiber, sheath, nonwoven fabrics; laminated composite polyolefin **membrane** for **battery separator** and filter)

L43 ANSWER 7 OF 15 HCA COPYRIGHT 2007 ACS on STN
132:4846 Crosslinked polymeric components of rechargeable solid lithium **batteries**. Swanson, David B.; Coffey, Brendan Michael; Read, Jeffrey A.; Lewin, Stanley (Ultralife Batteries, Inc., USA). PCT Int. Appl. WO 9963609 A1 **19991209**, 18 pp. DESIGNATED STATES: W: AL, AM, AU, BA, BB, BG, BR, CA, CN, CU, CZ, EE, GD, GE, HR, HU, ID, IL, IN, IS, JP, KG, KP, KR, LC, LK, LR, LT, LV, MD, MG, MK, MN, MX, NO, NZ, PL, RO, SG, SI, SK, SL, TR, TT, UA, US, UZ, VN, YU, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM; RW: AT, BE, BF, BJ, CF, CG, CH, CI, CM, CY, DE, DK, ES, FI, FR, GA, GB, GR, IE, IT, LU, MC, ML, MR, NE, NL, PT, SE, SN, TD, TG. (English). CODEN: PIXXD2. APPLICATION: WO 1999-US12096 19990601. PRIORITY: US 1998-89207 19980602.

AB A rechargeable solid polymer **lithium ion battery** cell assembly including a pos. electrode, a neg. electrode, and a **separator membrane** in which at least one of the pos. electrode, the neg. electrode and the separator includes a crosslinkable polymer free from crosslinking additives and crosslinked by exposing the assembly to actinic radiation prior to providing an electrolyte to the assembly is provided. A method is provided for making the solid polymer **lithium ion battery** cell assembly and the individual cell components by providing a crosslinkable polymer to at least one of the cell components, exposing the component to actinic radiation, and crosslinking the polymer. This invention can prevent degrdn. of the cell electrode and separator structures in a polymer **electrolyte lithium ion cell** and reduces cell problems related to high temp. failure and reduced useful **battery** life.

IT **7440-44-0**, Carbon, uses
(crosslinked polymeric components of rechargeable solid lithium

**batteries**)
RN 7440-44-0 HCA
CN Carbon (CA INDEX NAME)

C

IC ICM H01M006-16
ICS H01M006-18
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38
ST lithium **battery** crosslinked polymeric component
IT Secondary **batteries**
(crosslinked polymeric components of rechargeable solid lithium **batteries**)
IT Carbon black, uses
Fluoropolymers, uses
(crosslinked polymeric components of rechargeable solid lithium **batteries**)
IT Secondary **batteries**
(lithium; crosslinked polymeric components of rechargeable solid lithium **batteries**)
IT Electron beams
(radiation; crosslinked polymeric components of rechargeable solid lithium **batteries**)
IT 116-15-4, Hexafluoropropylene 7429-90-5, Aluminum, uses **7440-44-0**, Carbon, uses 7440-50-8, Copper, uses 7631-86-9, Silica, uses 7782-42-5, Graphite, uses 9011-17-0, Hexafluoropropylene-vinylidene fluoride copolymer 24937-79-9, Polyvinylidene fluoride 39457-42-6, Lithium manganese oxide
(crosslinked polymeric components of rechargeable solid lithium **batteries**)
IT 78-51-3 84-66-2, Diethyl phthalate 84-74-2, Dibutyl phthalate 96-49-1, Ethylene carbonate 108-32-7, Propylene carbonate 131-11-3, Dimethyl phthalate
(plasticizer; crosslinked polymeric components of rechargeable solid lithium **batteries**)

L43 ANSWER 8 OF 15 HCA COPYRIGHT 2007 ACS on STN
131:229819 Porous resin **membranes** for **separators** of secondary **batteries**. Miki, Yasuaki; Aya, Tetsuya (Mitsubishi Chemical Industries Ltd., Japan). Jpn. Kokai Tokkyo Koho JP 11255931 A **19990921** Heisei, 5 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 1998-320290 19981111. PRIORITY: JP 1998-2174 19980108.
AB Title inorg. gas plasma-treated membranes show a thickness (T) of 5-200 μm, pore degree (Pd) of 20-80%, Garley gas permeability (Pg) of 10-1,500 s/100 cm3, thermal blockade temp. (Pt) of

90-160°, and film-breaking temp. (Ft; by thermal mech. anal.) of 160-300° and ≥15° of Pt. A porous . ultrahigh-**mol**.wt. polyethylene **film** with T 25.8 μm was treated with Ar plasma to give a film showing Pd 44.2%, Pg 845 s/100 cm3, Pt 135°, Ft 175°, and water-contact angle 84.7°.

IC ICM C08J009-00
ICS B29C067-20; C08L023-02; C08L027-12; H01M002-16; H01M010-40; B29K023-00; B29K027-12; B29K105-04

CC 38-3 (Plastics Fabrication and Uses)
Section cross-reference(s): 72

ST porous polyolefin **membrane battery separator**; fluoropolymer porous **membrane battery separator**

IT Halogens
(gas, plasma; inorg. gas plasma-treated porous resin membranes with specific properties for secondary **battery** separators)

IT Plasma
Secondary **batteries**
(inorg. gas plasma-treated porous resin membranes with specific properties for secondary **battery** separators)

IT Fluoropolymers, uses
Polyolefins
(inorg. gas plasma-treated porous resin membranes with specific properties for secondary **battery** separators)

IT Noble gases, uses
(plasma; inorg. gas plasma-treated porous resin membranes with specific properties for secondary **battery** separators)

IT Membranes, nonbiological
(porous; inorg. gas plasma-treated porous resin membranes with specific properties for secondary **battery** separators)

IT 9002-88-4, Polyethylene
(inorg. gas plasma-treated porous resin membranes with specific properties for secondary **battery** separators)

IT 124-38-9, Carbon dioxide, uses 1333-74-0, Hydrogen, uses 7440-37-1, Argon, uses 7440-59-7, Helium, uses 7727-37-9, Nitrogen, uses 7782-44-7, Oxygen, uses
(plasma; inorg. gas plasma-treated porous resin membranes with specific properties for secondary **battery** separators)

L43 ANSWER 9 OF 15 HCA COPYRIGHT 2007 ACS on STN

126:278646 High-strength porous **films** containing high-**molecular**-weight polyethylene and their preparation. Fujii, Toshio; Mochizuki, Tatsuya (Mitsubishi Chemical Corporation, Japan). Eur. Pat. Appl. EP 767200 A2 **19970409**, 7 pp. DESIGNATED STATES: R: DE, FR, GB. (English). CODEN: EPXXDW. APPLICATION: EP 1996-115836 19961002. PRIORITY: JP 1995-258612 19951005.

AB High-strength porous film or sheet with high surface strength and moderate degree of air permeability, useful for **battery separators**, filter **membranes**, air-permeable jumpers and diaper and sanitary napkins (no data), contg. polyethylene resin having a viscosity-av. mol. wt. of >300,000 is manufd. by melt-extruding, molding and stretching with machine direction (MD)/transverse direction (TD) overall deformation ratio = 0.1-1. Thus, a mixt. of 25 parts polyethylene having viscosity-av. mol. wt. 2,000,000 and 75 parts stearyl alc. was extruded at 170° and molded into film with draft ratio 12 and blow ratio 9, and after extg. the stearyl alc., the film was stretched twice the original length in the machine direction at 120° and 4 times in the transverse direction at 128° (MD/TD overall deformation ratio 0.7) to give a porous film with thickness 25 μm showing pin puncture strength 700 g/25 μm, air permeability 450 s/100 cc and porosity 45%, vs. 400, 120 and 65, resp., for a sample stretched with MD/TD overall deformation ratio 1.3.

IC ICM C08J009-28
ICA C08L023-06
CC 38-3 (Plastics Fabrication and Uses)
Section cross-reference(s): 52
ST polyethylene porous **film** high **mol** wt; **battery** separator polyethylene porous film; filter membrane polyethylene porous film; melt extrusion stretching molding PE film
IT Porous materials
(films, polyethylene; high-strength porous **films** contg. high-**mol**.-wt. polyethylene and their prepn.)
IT Disposable diapers
Membrane filters
Primary **battery** separators
(high-strength porous films or sheets contg. high-mol.-wt. polyethylene for)
IT Films
(porous films, polyethylene; high-strength porous **films** contg. high-**mol**.-wt. polyethylene and their prepn.)
IT Films
(porous, polyethylene; high-strength porous **films** contg. high-**mol**.-wt. polyethylene and their prepn.)
IT 9002-88-4, Polyethylene
(film; high-strength porous **films** contg. high-**mol**.-wt. polyethylene and their prepn.)

L43 ANSWER 10 OF 15 HCA COPYRIGHT 2007 ACS on STN
125:38002 Secondary lithium **battery** using new layered titanium phosphate anode material. Chen, Jin-Ming; Li, Yingjeng J.; Hurng, Weir-Mirn; Whittingham, M. Stanley (Industrial Technology Research Institute, Taiwan). U.S. US 5514490 A **19960507**, 10 pp. (English). CODEN: USXXAM. APPLICATION: US 1994-298510 19940830.

AB The **battery** with a stable operating voltage of 3-V uses a layered Ti phosphate TiO(OH)(H2PO4) or LTP as anode material and LiCoO2, LiNiO2 or other appropriate material, as cathode. The LTP is prepd. by 1st reacting a Me4NOH soln. contg. H3PO4 with TiO2 in a low temp. hydrothermal reaction to form a Me4N+ form of layered Ti phosphate or NMe4TP, which serves as the precursor of LTP. This precursor is then placed in a concd. HCl at .apprx.20° to obtain a high-purity LTP via a cation exchange reaction. Each of the LixLTP chem. unit, which is formed after the **intercalation** of LTP with **Li ions**, can contain 2 **Li ions**, thus excellent **Li intercalation** characteristic can be achieved as a result. Also, no Li dendrites are formed during the recharging operation which tend to puncture the partition **membranes sepg.** the anode and the cathode; therefore, the Li **battery** maintains a safe recharging operation.

IC ICM H01M006-16

INCL 429191000

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 49

ST lithium **battery** layered titanium phosphate anode; safety lithium **battery** titanium phosphate anode

IT Anodes
(**battery**, lithium-**intercalatable** layered titanium phosphate)

IT 7439-93-2, Lithium, uses
(**battery** anodes from layered titanium phosphate **intercalatable** with)

IT 30786-06-2P
(**battery** anodes from lithium-**intercalatable** layered)

IT 12031-65-1, Lithium nickel oxide (LiNiO2) 12190-79-3, Cobalt lithium oxide (CoLiO2)
(**battery** cathode)

IT 75-59-2, Tetramethylammonium hydroxide 7664-38-2, Phosphoric acid, processes 13463-67-7, Titanium oxide (TiO2), processes
(in prepn. of layered titanium phosphate for **battery** anodes)

L43 ANSWER 11 OF 15 HCA COPYRIGHT 2007 ACS on STN

122:33280 Polyethylene multilayer membranes with thermostatically pore shut-off property and their manufacture. Sugiura, Katsuhiko; Shimizu, Akyuki (Mitsubishi Chemical Industries Co., Ltd., Japan). Jpn. Kokai Tokkyo Koho JP 06182918 A **19940705** Heisei, 5 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 1992-338954 19921218.

AB The title membranes useful as **battery** separators, etc. are manufd. by melt blending a ultrahigh-mol.-wt. polyethylene having

the viscosity-av. mol. wt. of >500,000 with plasticizers, forming the blend into films or sheets, removing the plasticizers from them by extn., stretching the resulting porous membranes at least in one direction at temp. lower than the m.p. of polyethylene, and laminating them with un-stretched polyethylene microporous membranes.

IC ICM B32B005-32
ICS B32B027-32; H01M006-02

CC 38-3 (Plastics Fabrication and Uses)
Section cross-reference(s): 52

ST multilayer thermostatic working **separator membrane** polyethylene

IT **Batteries**, primary
(**separators**, polyethylene multilayer **membranes** with thermostatically shut-off property for)

IT 9002-88-4, Polyethylene
(ultrahigh-**mol**.-wt.; **multilayer** membranes with thermostatically shut-off property and manuf.)

L43 ANSWER 12 OF 15 HCA COPYRIGHT 2007 ACS on STN

120:246954 Polyethylene porous film for **battery separator** and filtering **membrane**. Sugiura, Katsuhiko; Handa, Keishin (Mitsubishi Chemical Industries Co., Ltd., Japan). Jpn. Kokai Tokkyo Koho JP 05310989 A **19931122** Heisei, 5 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 1992-111820 19920430.

AB The film showing self-blocking properties and good dimensional stability when overheated is prepd. from an ultrahigh-mol.-wt. polyethylene (I) with viscosity-av. mol. wt. (Mv) ≥500,000 and has a gas permeability of ≥1000 s/100 mL when being heated over its m.p. Kneading 20 parts I powder (m.p. 135°) and 80 parts stearyl alc., extruding through a T-die, and soaking in a 60° iso-PrOH bath gave a porous film with thickness 47 μm, voids 67%, gas permeability 105 s/100 mL, and water permeability 400 L/h-m2-atm.

IC ICM C08J009-26
ICS B01D071-26; C08J009-26; H01M002-16

ICI C08L023-06

CC 38-3 (Plastics Fabrication and Uses)
Section cross-reference(s): 52

ST polyethylene porous film **battery** separator; filtering membrane polyethylene porous film; dimension stable polyethylene porous film

IT **Batteries**, primary
**Batteries**, secondary
(separators, polyethylene porous films, dimensionally stable and self-blocking)

IT 9002-88-4, Polyethylene

(ultrahigh-**mol.**-wt., porous **films**, dimensionally stable and self-blocking, for **battery separator** and filtering **membrane**)

L43 ANSWER 13 OF 15 HCA COPYRIGHT 2007 ACS on STN
106:159576 Secondary **battery** with nonaqueous electrolyte. Yoshino, Akira; Sanechika, Kenichi; Nakajima, Takayuki (Asahi Chemical Industry Co., Ltd., Japan). Eur. Pat. Appl. EP 205856 A2 **19861230**, 43 pp. DESIGNATED STATES: R: CH, DE, FR, GB, LI. (English). CODEN: EPXXDW. APPLICATION: EP 1986-106301 19860507. PRIORITY: JP 1985-97695 19850510; JP 1985-100101 19850511; JP 1985-100102 19850511; JP 1985-130676 19850618; JP 1985-130677 19850618; JP 1985-130678 19850618.

AB A secondary nonaq.-electrolyte **battery** has ≥1 electrode made of a layer-structure composite oxide AxMyQzO2 or an n-doped carbonaceous material, where A is ≥1 member selected from alkali metals; M is a transition metal; Q is Al, In and/or Sn; x = 0.05-1.10; y = 0.85-1.00; and z = 0.001-0.10. The carbonaceous material has a Brunauer-Emmet-Teller sp. surface area (A, m2/g) of 0.1 <A <100 and a crystal thickness (L, Å) in the x-ray diffraction and a true d. (ϕ, g/cm3) satisfying the relations: 1.70 <ϕ <2.18 and 10 <L <120ϕ-189. An anode (1 + 5 cm) of a carbonaceous material and a Li1.03Co0.95Sn0.042O2 cathode (1 + 5 cm) were prepd. When a **battery** using these electrodes, a microporous 35-μ polyethylene **membrane separator**, and a 0.6M LiClO4 in propylene carbonate electrolyte was charged at 2 mA for 50 min it showed an open-circuit voltage of 3.9 V. The proportion of **Li+ ions** taken up/C atom by this charging, the utilization coeff. was 0.12. The charging and discharging voltages of the **battery**, and the changes of current efficiency and the utilization coeff. in **battery** cycling were detd. The **battery** self-discharge ratio after standing at 25° for 720 h was 15%. The energy d./active anode material in the 5th cycle was 911 W-h/kg.

IT **7440-44-0P**
(carbon fibers, anodes, manuf. of, for nonaq.-electrolyte **batteries**)

RN 7440-44-0 HCA
CN Carbon (CA INDEX NAME)

C

IC ICM H01M010-40
ICS H01M004-58; H01M004-48

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST **battery** composite oxide carbonaceous material; org electrolyte **battery**; lithium cobalt tin oxide cathode;

anode carbonaceous material anode

IT Carbon black, uses and miscellaneous
Carbon fibers, uses and miscellaneous
Carbonaceous materials
(anodes, manuf. of, for nonaq.-electrolyte **batteries**)

IT Pitch
(asphalt, in manuf. of carbonaceous materials, for **battery** anodes)

IT Rubber, nitrile, uses and miscellaneous
(binder, in manuf. of anodes of carbonaceous materials, for nonaq.-electrolyte **batteries**)

IT **Batteries**, secondary
(carbonaceous material-composite oxide, with nonaq. electrolyte, light and high energy-d.)

IT Anthracene oil
(in manuf. of carbonaceous materials, for **battery** anodes)

IT Tar
(coal, in manuf. of carbonaceous materials, for **battery** anodes)

IT Rubber, synthetic
(fluoro, binder, in manuf. of anodes of carbonaceous materials, for nonaq.-electrolyte **batteries**)

IT Coke
(petroleum, in manuf. of carbonaceous materials, for **battery** anodes)

IT 9002-85-1, Poly(vinylidene chloride) 9004-70-0, Nitrocellulose
9010-98-4, Polychloroprene 24937-79-9, Poly(vinylidene fluoride)
(binder, in manuf. of cathodes of composite oxides, for nonaq.-electrolytes **batteries**)

IT **7440-44-0P**
(carbon fibers, anodes, manuf. of, for nonaq.-electrolyte **batteries**)

IT 107762-88-9P 107763-53-1P 107763-54-2P 107763-55-3P
107763-56-4P 107763-86-0P
(cathode, manuf. of, for nonaq.-electrolyte **batteries**)

IT 25014-41-9, Polyacrylonitrile
(fibers, in manuf. of carbonaceous materials, for **battery** anodes)

IT 75-01-4, Vinyl chloride, uses and miscellaneous 215-14-5, Tetrabenzophenazine
(in manuf. of carbonaceous materials, for **battery** anodes)

IT 9003-18-3
(rubber, binder, in manuf. of anodes of carbonaceous materials, for nonaq.-electrolyte **batteries**)

L43 ANSWER 14 OF 15 HCA COPYRIGHT 2007 ACS on STN

105:210131 Microporous membrane of ultrahigh-molecular-weight α-olefin polymer. Kono, Koichi; Mori, Shoichi; Miyasaka, Kenji; Tabuchi, Jyoichi (Toa Nenryo Kogyo K. K., Japan). Eur. Pat. Appl. EP 193318 A2 **19860903**, 17 pp. DESIGNATED STATES: R: BE, DE, FR, GB, IT, NL. (English). CODEN: EPXXDW. APPLICATION: EP 1986-301047 19860214. PRIORITY: JP 1985-34576 19850225; JP 1985-34578 19850225; JP 1985-34577 19850225.

AB A microporous membrane having a void ratio of 30-90% is prepd. from an α-olefin polymer soln. by forming a gel-like object, removing 10-90% of the solvent, orienting the object, and removing the residual solvent. A film is also prepd. by pressing the microporous membrane. The polymer has av. mol. wt. .gtorsim.5 + 105. The object is oriented monoaxially at draw ratio >2 and biaxially at areal draw ratio >10. The membrane is useful as a **battery** separator, electrolytic condenser separator, filter, etc. Thus, a liq. paraffin contg. 4.0% polypropylene (I) (wt.-av. mol. wt. 4.7 + 106) was stirred at 200° to prep. a soln. The soln. was added to a heat mold and rapidly cooled to 15° to give a sheet (thickness 2 mm). The sheet was dipped in CH2Cl2 for 60 min and dried on a flat plate to give a sheet contg. 19.4% I and having 79.4% shrinkage (in thickness direction). The sheet was oriented biaxially at 150° (draw ratio 8 + 8), washed with CH2Cl2, and dried to give a membrane having thickness 1.8 μ, tensile strength 180 kg/cm2, elongation at break 81%, area-av. pore size 0.234 μ, no.-av. pore size 0.149 μ, and void ratio 35.8%.

IC ICM C08J009-28
ICS C08J005-18; B01D013-04

CC 38-3 (Plastics Fabrication and Uses)
Section cross-reference(s): 52

ST polyolefin microporous membrane film; polypropylene microporous membrane film; orientation polyolefin microporous membrane; **battery separator membrane** polyolefin; **electrolytic cell** membrane polyolefin; filter membrane polyolefin; porosity membrane polyolefin manuf

IT **Electrolytic cells**
(diaphragm, of α-olefin polymers, prepn. of)

IT **Batteries**, primary
(separators, of α-olefin polymers, prepn. of)

IT 9003-07-0P
(microporous membranes and **films** of high-**mol**.-wt., prepn. of)

L43 ANSWER 15 OF 15 HCA COPYRIGHT 2007 ACS on STN

85:49192 **Dry-cell battery**. Asaoka, Junichi; Ohta, Akira; Nakai, Masanori; Sato, Koichi (Matsushita Electric Industrial Co., Ltd., Japan). Jpn. Kokai Tokkyo Koho JP 50134142 **19751024** Showa, 3 pp. (Japanese). CODEN:

JKXXAF. APPLICATION: JP 1974-43165 19740416.

AB A **dry-cell battery** separator consisting of a poly(vinyl alc.) [9002-89-5] membrane (d.p. 500-2500, degree of sapon. 94-9 mole%), a paper sheet, and a paste layer is placed between a cathode mix and a Zn anode, the paste layer facing the anode. An aq. soln. contg. <10% NH4Cl and 15-30% ZnCl2 is used as electrolyte. The **dry-cell battery** has good storage stability and discharging efficiency. Thus, a poly(vinyl alc.) film (d.p. 1500, degree of sapon. 97 **mole**%) was **laminated** on a 100-μ thick kraft paper, and the other side of the kraft paper was coated with a paste. The laminate was rolled, and the paper tube with paste layer on its outer side was inserted in a Zn anode can. A cathode mix contg. MnO2, acetylene black, and electrolyte (5% NH4Cl, 25% ZnCl2) was pressed around a carbon electrode at center. The **battery** was kept at 45° for 3 months and discharged twice a day under a load of 2 Ω for 30 min. The discharge index was 120, based on 100 for a conventional **dry-cell battery**, where the kraft paper separator was not laminated with the poly(vinyl alc.) film.

IC H01M

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST polyvinyl alc separator **battery**; **dry cell battery** separator

IT **Batteries, primary**
(**dry-cell**, Leclanche, poly(vinyl alc.) **membrane**-contg. **separator** for)

IT 9002-89-5
(separator from paper and membrane of, **dry-cell battery**)

=> D L44 1-7 CBIB ABS HITSTR HITIND

L44 ANSWER 1 OF 7 HCA COPYRIGHT 2007 ACS on STN

138:139986 Removal of Hydrogen Sulfide from a Fuel Gas Stream by Electrochemical **Membrane Separation**. Burke, Alan; Winnick, Jack; Xia, Changrong; Liu, Meilin (School of Chemical Engineering, Georgia Institute of Technology, Atlanta, GA, 30332, USA). Journal of the Electrochemical Society, 149(11), D160-D166 (English) **2002**. CODEN: JESOAN. ISSN: 0013-4651. Publisher: Electrochemical Society.

AB A lab.-scale **electrochem. cell** was used for desulfurization of a synthetic fuel gas process stream contg. up to 3000 ppm H2S. The cell was run at typical gasifier temps. (600-650°) and ambient pressure. The removal rate of H2S can be limited either by gaseous diffusion from the fuel stream to the cathode-electrolyte interface or by liq. diffusion of sulfur ions

through the electrolytic membrane, depending on operating conditions (i.e., temp. and H2S concn.) and cell design (such as membrane thickness, membrane tortuosity, and flow channel design). For a 200 mL/min gas flow with a compn. of 34.14% CO, 22.16% CO2, 35.13% H2, 8.51% H2O, and 1200 ppm H2S at 600°, the rate of H2S removal is limited by diffusion of sulfide ions through a porous membrane with a thickness of 0.9 mm, a porosity of 38%, and a tortuosity of 3.8. The cell achieved removal fluxes .apprx.1.1 + 10-6 g-mol H2S min-1 cm-2 at 650°. While Y0.9Ca0.1FeO3 cathode offered adequate stability and cond. to study the system at temps. up to 700°, the long-term cathode stability is still under study.

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 51

ST hydrogen sulfide removal fuel gas stream **electrochem cell** membrane

IT Nernst-Ettingshausen effect
(electrolysis of water; removal of hydrogen sulfide from a fuel gas stream by electrochem. **membrane sepn.**)

IT Desulfurization
Fuel cells
Membranes, nonbiological
Separation
Synthesis gas
(removal of hydrogen sulfide from a fuel gas stream by electrochem. **membrane sepn.**)

IT 144022-39-9, Calcium iron yttrium oxide (Ca0.1FeY0.9O3)
(combustion cathode; removal of hydrogen sulfide from a fuel gas stream by electrochem. **membrane sepn.**)

IT 12013-10-4, Cobalt sulfide (CoS2)
(electrodes; removal of hydrogen sulfide from a fuel gas stream by electrochem. **membrane sepn.**)

IT 11099-02-8D, Nickel oxide, **intercalated** complex with **lithium** hydroxide
(electrodes; removal of hydrogen sulfide from a fuel gas stream by electrochem. **membrane sepn.**)

IT 12017-76-4, Cobalt sulfide (Co9S8) 12052-64-1, Cobalt sulfide (Co4S3)
(formed during operations; removal of hydrogen sulfide from a fuel gas stream by electrochem. **membrane sepn**
.)

IT 7732-18-5, Water, reactions
(hampers carbon deposition; removal of hydrogen sulfide from a fuel gas stream by electrochem. **membrane sepn**
.)

IT 23550-45-0P, Sulfur (S2), preparation
(made at cathode; removal of hydrogen sulfide from a fuel gas stream by electrochem. **membrane sepn.**)

IT 144971-78-8, **Lithium** potassium carbonate

(Li1.24K0.76(CO3))
(molten electrolyte; removal of hydrogen sulfide from a fuel gas stream by electrochem. **membrane sepn.**)

IT 56-40-6, Glycine, reactions
(oxidant; removal of hydrogen sulfide from a fuel gas stream by electrochem. **membrane sepn.**)

IT 12035-71-1, Heazlewoodite (ni3S2)
(phase formed on cathode; removal of hydrogen sulfide from a fuel gas stream by electrochem. **membrane sepn.**)

IT 1333-74-0, Hydrogen, formation (nonpreparative)
(removal of hydrogen sulfide from a fuel gas stream by electrochem. **membrane sepn.**)

IT 630-08-0, Carbon monoxide, formation (nonpreparative)
(removal of hydrogen sulfide from a fuel gas stream by electrochem. **membrane sepn.**)

IT 1310-65-2D, **Lithium** hydroxide (**Li**(OH)), **intercalated** complex with nickel oxide
(removal of hydrogen sulfide from a fuel gas stream by electrochem. **membrane sepn.**)

IT 124-38-9, Carbon dioxide, reactions
(removal of hydrogen sulfide from a fuel gas stream by electrochem. **membrane sepn.**)

IT 7783-06-4, Hydrogen sulfide (H2S), reactions
(removal of hydrogen sulfide from a fuel gas stream by electrochem. **membrane sepn.**)

L44 ANSWER 2 OF 7 HCA COPYRIGHT 2007 ACS on STN
136:250317 Nonaqueous electrolyte **battery**. Sasaki, Hideki (Japan Storage Battery Co., Ltd., Japan). Jpn. Kokai Tokkyo Koho JP 2002093463 A **20020329**, 6 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 2000-275421 20000911.

AB The **battery** has a **Li intercalating** cathode, a **Li** contg. anode with a Cu collector, and a porous polymer electrolyte; where the cathode has a capacity d. ≥400 mA.h/cm2.

IC ICM H01M010-40
ICS H01M002-16; H01M004-02; H01M004-62

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST secondary **lithium battery** cathode capacity density

IT Secondary **batteries**
(**lithium**; secondary **lithium batteries** use cathodes with controlled capacity d. and porous polymer membrane/graphite contg. polymer **membrane separators**)

IT 143623-51-2, Cobalt **lithium** nickel oxide (Co0.15LiNi0.85O2)
(cathodes with controlled capacity d. for secondary

**lithium batteries**)
IT 7782-42-5, Graphite, uses 25014-41-9, Polyacrylonitrile
(separators contg. porous polymer membranes and graphite contg. polymer membranes for secondary **lithium batteries**)

L44 ANSWER 3 OF 7 HCA COPYRIGHT 2007 ACS on STN
130:170687 Secondary **lithium batteries** with electrolyte containing separators. Suzuki, Shinkazu; Iyasu, Kotaro (Toshiba Corp., Japan). Jpn. Kokai Tokkyo Koho JP 11067273 A **19990309** Heisei, 7 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 1997-225103 19970821.
AB The **batteries** have **Li**, **Li** alloy, or **Li intercalating** anodes, **Li** contg. multiple oxide cathodes, separators between the electrodes, and an electrolyte contg. an ionizable **Li** salt dissolved in a nonaq. solvent; where the **separators** are porous **membranes** contg. a gel electrolyte in their pore and on their surface.
IC ICM H01M010-40
ICS H01M002-16; H01M002-18
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
ST **lithium battery** gel electrolyte impregnated separator
IT Polyamide fibers, uses
(polymer electrolyte impregnated porous polyamide fiber separators for secondary **lithium batteries**)
IT Secondary **battery** separators
(polymer electrolyte impregnated porous polymer separators for secondary **lithium batteries**)
IT Polyoxyalkylenes, uses
(polymer electrolyte impregnated porous polymer separators for secondary **lithium batteries**)
IT 9002-88-4, Polyethylene
(polymer electrolyte impregnated porous polyethylene separators for secondary **lithium batteries**)
IT 7791-03-9, **Lithium** perchlorate 9011-14-7, Pmma 25014-41-9, Polyacrylonitrile 25322-68-3, Poly(ethylene oxide) 25747-73-3, Poly(vinylene carbonate)
(polymer electrolyte impregnated porous polymer separators for secondary **lithium batteries**)

L44 ANSWER 4 OF 7 HCA COPYRIGHT 2007 ACS on STN
129:69926 High power capacity **batteries**. Sprinovskis, Janis; Bauze, Aivars (Bauze, Aivars, Latvia). PCT Int. Appl. WO 9825319 A1 **19980611**, 38 pp. DESIGNATED STATES: W: AU, CA, CN, JP, KR, UA, US, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM; RW: AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE. (English). CODEN:

PIXXD2. APPLICATION: WO 1997-LV1 19970307. PRIORITY: LV 1996-450 19961205.

AB The title **batteries** include cathodes, anodes, films/ **membranes** electrolytes, and **separators** worked along the perimeter into the frames and mutually included in inert thermoplastic material films or sheets; frames glued or welded together with any suitable method, in a special welding area; and cover films or sheets welded to them, whereas the contact outlets of the electrodes in required places are brought through the electrode frames.

IT **7439-93-2, Lithium,** uses
(**battery** anodes from graphite **intercalated** with)

RN 7439-93-2 HCA

CN Lithium (CA INDEX NAME)

Li

IC H01M010-04; H01M002-14; H01M004-02; H01M010-40

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST **battery** secondary high performance

IT **Battery** anodes
(alkali metal- or aluminum- or calcium- or magnesium-**intercalated** graphite for)

IT Alkali metals, uses
(graphite **intercalated** with; **battery** anodes)

IT **Battery** cathodes
(graphite-transition metal compds. for)

IT Secondary **batteries**
(high-performance)

IT 7782-42-5, Graphite, uses
(**battery** anodes alkali metal- or aluminum- or calcium- or magnesium-**intercalated**)

IT 7429-90-5, Aluminum, uses **7439-93-2, Lithium,** uses 7439-95-4, Magnesium, uses 7440-09-7, Potassium, uses 7440-23-5, Sodium, uses 7440-70-2, Calcium, uses
(**battery** anodes from graphite **intercalated** with)

L44 ANSWER 5 OF 7 HCA COPYRIGHT 2007 ACS on STN

122:35249 Secondary nonaqueous electrolyte **batteries** with improved separators. Takahashi, Masatoshi; Ooshita, Ryuji; Suemori, Atsushi; Nishio, Koji; Saito, Toshihiko (Sanyo Electric Co, Japan). Jpn. Kokai Tokkyo Koho JP 06231745 A **19940819** Heisei, 5 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 1993-41948 19930205.

AB The **batteries** use **Li intercalating**

carbonaceous or metal oxide anodes and microporous polyethylene **membrane separators**, which have thickness 20-40 μm and max. pore diam. 0.20-0.40 μm. The C materials may be graphite or cokes. The metal oxides may be Fe oxides, WO3, or Nb2O5. The **batteries** provide good high-rate discharge performance and improved safety.

IC ICM H01M002-16
ICS H01M002-18; H01M010-40

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST **lithium battery** separator polyethylene; safety **lithium battery** polyethylene separator

IT Coke
(anode; microporous polyethylene separators in secondary **lithium batteries** for safety and performance)

IT Safety
(microporous polyethylene separators in secondary **lithium batteries** for safety and performance)

IT **Batteries**, secondary
(separators, microporous polyethylene separators in secondary **lithium batteries** for safety and performance)

IT 1313-96-8, Niobium oxide
(anode; microporous polyethylene separators for **batteries** with **lithium intercalating** anodes)

IT 1314-35-8, Tungsten oxide, uses 1332-37-2, Iron oxide, uses 7782-42-5, Graphite, uses
(anodes; microporous polyethylene separators for **batteries** with **lithium intercalating** anodes)

IT 9002-88-4, Polyethylene
(microporous polyethylene separators in secondary **lithium batteries** for safety and performance)

L44 ANSWER 6 OF 7 HCA COPYRIGHT 2007 ACS on STN

119:206963 **Lithium** polymer **batteries**. Scrosati, Bruno; Neat, Robin J. (Dip. Chim., Univ. Roma, 'La Sapienza', Rome, 00185, Italy). Appl. Electroact. Polym., 182-222. Editor(s): Scrosati, Bruno. Chapman & Hall: London, UK. (English) **1993**. CODEN: 59KCAE.

AB A review with 57 refs. on **Li batteries** using polymeric ion membranes which act as electrolyte and separator. Prepn. of PEO-**Li** salt polymer membranes, **battery** configurations, reversible **Li intercalation** compds. as cathodes, and **battery** development are discussed.

IT **7439-93-2D**, **Lithium**, salts
(PEO membranes contg., electrolyte and separator, for large-area solid-state **batteries**)

RN 7439-93-2 HCA

CN Lithium (CA INDEX NAME)

Li

CC 52-0 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38
ST review **lithium battery** PEO membrane; electrolyte **separator** PEO **membrane** review
IT **Battery** electrolytes
(PEO-**lithium** salt membranes, large-area)
IT **Batteries**, secondary
(**lithium/intercalation** compd., with PEO-**lithium** salt membranes, concept and configuration and development of)
IT Polyoxyalkylenes, uses
(membranes, contg. **lithium** salts, electrolyte and separator, for **batteries**)
IT **Batteries**, secondary
(separators, PEO-**lithium** salt membranes, large-area)
IT **7439-93-2D**, **Lithium**, salts
(PEO membranes contg., electrolyte and separator, for large-area solid-state **batteries**)
IT 25322-68-3, PEO
(membranes, contg. dissolved **lithium** salts, electrolyte and separator, for **batteries**)

L44 ANSWER 7 OF 7 HCA COPYRIGHT 2007 ACS on STN
119:12124 Secondary nonaqueous-electrolyte **lithium battery**. Hasegawa, Masaki; Murai, Sukeyuki; Ito, Shuji; Mifuji, Yasuhiko; Toyoguchi, Yoshinori (Matsushita Electric Ind Co Ltd, Japan). Jpn. Kokai Tokkyo Koho JP 05062662 A **19930312** Heisei, 4 pp. (Japanese). CODEN: JKXXAF. APPLICATION: JP 1991-222622 19910903.
AB The **battery** comprises an anode, a **Li-intercalatable** cathode, and a separator of mainly porous polyolefin membrane and polyimide porous body. The **battery** inhibits minute short circuiting and rapid temp. elevation.
IC ICM H01M002-16
ICS H01M002-18; H01M010-40
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38
ST **lithium battery** separator polyolefin polyimide
IT Polyimides, uses
(separators from porous, for secondary **lithium battery**)
IT Alkenes, polymers
(polymers, separators from porous, for secondary **lithium**

**battery**)

IT **Batteries**, secondary
(**separators**, polyolefin porous **membranes** and polyimide porous body, **lithium**)

IT 9002-88-4, Polyethylene 9003-07-0, Polypropylene
(separators from porous, for secondary **lithium** **battery**)